

EAST ANGLIA BRANCH NEWSLETTER

The newsletter of the East Anglia branch of the Institute of Physics

November 2006

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Buckyballs, brain scans and the Big Bang theory

We wish to welcome back the Cambridge Physics Centre for its 27th series of lectures. This series goes from strength to strength, and this year's lectures again look very tempting, with speakers who are very good at what they do – so be sure to put it in your diary. The lectures will all be given in the Pippard Lecture Theatre at the Cavendish Laboratory, JJ Thomson Avenue, Madingley Road, Cambridge CB3 0HE, and will start at 6.00 p.m. If you are not quite sure how to get there, please check out <http://www.phy.cam.ac.uk/directions.php> for directions to the venue. There is no need to book, since the lectures are free.

The first lecture, by Dr Simon Singh, will be on Thursday 12 October. Dr Singh is an author, journalist and TV producer, specialising in science and mathematics. He is the author of *Fermat's Last Theorem* and *The Code Book*, and will be talking about his latest book, *Big Bang*, which is a history of cosmology.

As well as explaining what the Big Bang theory actually is, Dr Singh will recount how the theory emerged and tell the story of the brilliant and eccentric scientists who fought against the establishment idea of an eternal and unchanging cosmos. He will also look at the astronomical evidence in

favour of a Big Bang moment of creation, and discuss why today's cosmologists remain confident that the Big Bang theory is an accurate description of the origin and evolution of the universe.

The lecture is likely to cover topics as diverse as Led Zeppelin, the Teletubbies and an electrified gherkin. To find out more about Simon Singh, visit his website at www.simonsingh.net. (Please note: you will be able to purchase Simon Singh's latest book, *Big Bang*, for £5, before or after the lecture.)

On Thursday 9 November, we have "From games to brains: the physics and computer science of medical imaging" by Dr Richard Anson. Dr Anson is a lecturer at the Cavendish Laboratory, and is part of the PET/MR project team, which is working on the construction of a prototype scanner that can do simultaneous positron emission tomography (PET) and magnetic resonance (MR) scans, and is exploring design concepts for clinical PET/MR scanners. This project is a collaboration between the Wolfson Brain Imaging Centre and the Department of Physics.

Hospital body scanners use cutting-edge physics to produce three-dimensional (3D) images of the human body. The scanning equipment is very expensive.

In the past, making 3D images from the scanner's signal could also be expensive. Now, however, very cheap display cards, developed for computer games, can be used to view the results as true 3D images. Thus it seems that computer games are good for your health! Dr Anson will describe how simultaneous PET and MR scans, combined with improved visualisation technology, can assist diagnosis and, therefore, improve the outcome for patients.

On Tuesday 5 December, we have "Rough Science", by Dr Jonathan Hare. Dr Hare is a freelance science communicator. His PhD work led to a method of making the "football" molecule carbon 60, or buckminsterfullerene. He has worked with British Gas developing a gas-powered car; as a "time lord" at the National Physical Laboratory, he worked with atomic clocks. He has been part of all of the BBC/Open University (OU) Rough Science and Hollywood Science teams, and is currently a visiting research fellow at Sussex University. He loves making things, juggling, hill walking, amateur radio and painting.

Based on the Rough Science series, this talk will delve a little deeper into the science used in the series. This will be complemented by film clips >>

Visit the branch website at <http://anglia.iop.org>

and demonstrations, covering topics ranging from finding gold in New Zealand to generating electricity from waves in the Indian Ocean. A light beam communicator, a Brighton seawater battery and much more will also be discussed. For further information, visit Jonathan's website at www.creative-science.org.uk.

Three talks are planned so far for 2007, for which we have, as yet, only the titles and speakers. More details will be provided when we have them.

● Thursday 25 January: "Why racing cars go fast" by Julian Cooper. Mr Cooper is the chief

engineer of Lola Cars, based in Huntingdon, which is the world's most successful manufacturer of production racing cars. The company has been building racing cars for almost half a century and has produced cars for almost every category of racing outside stock cars. In Champ Car racing, Lola is the most successful and most enduring brand, with a record of 154 wins over 38 years. Nine championships, including the last three, have been won by Lola drivers.

● Thursday 22 February: "Music to your ears" by Dr Wendy Sadler. Dr Sadler is a talented

physicist and musician, and is a lecturer in physics at the University of Cardiff. She has won many prizes, including the Welsh Woman of the Year (Science and Technology) award, the WISE excellence award for promoting science to girls and women, and the Institute of Physics Young Professional Physicist of the Year award in 2005 for working with the community.

● Tuesday 20 March: "Plastic electronics" by Prof. Henning Sirringhaus. Prof. Sirringhaus is Hitachi professor of electron device physics at the Microelectronics Research

Centre in the Cavendish Laboratory, University of Cambridge. He is also chief scientist and co-founder of Plastic Logic, a leading developer of plastic electronics technology. It develops and exploits new manufacturing processes which combine the power of electronics with the pervasiveness of printing. The company's technology enables it to develop new product concepts in a wide range of markets, including displays and sensors.

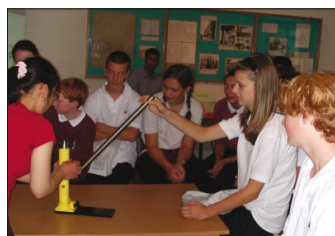
The Cambridge Physics Centre is supported by the Cavendish Laboratory and the Institute of Physics.

Physics at Work tackles science's big questions

The Physics at Work exhibition, which aims to encourage pupils studying physics or contemplating a career in physics or a physics-related area, was held this year on 19–21 September at the Cavendish Laboratory in Cambridge. As usual, it was sold out well in advance. People seem to have enjoyed the experience, with most of the exhibits rated as being well above average. Exhibitors came from the Cavendish, from other Cambridge departments and from industry, and gave a good idea of the wide variety of work that comes under the broad heading of "science".

There isn't space here to cover everything, but the exhibits that follow give a flavour of Physics at Work. For instance, the Cavendish safety officer showed that safety at work, which can't be forgotten nowadays, doesn't need to be boring. In many working environments the presence of inflammable vapours, such as methane in a coal mine or petroleum on an oil rig, is unavoidable. In such cases, how can it be ensured that vital electrical equipment will not cause sparks that ignite the vapours? The exhibit suggested some answers.

The Astrophysics Group looked at how they – and we – can answer big questions



Demonstrating a lever at Physics at Work: "Give me a place to stand, and I will move the world."

such as "Where did the stars come from?" and "Why do we think there was a Big Bang?" And the Department of Earth Sciences looked at the crater left by a 10 km diameter meteor that struck the Earth 65 million years ago, and described how it is using seismic studies (think man-made micro-earthquakes) to build up a better understanding of the size and direction of the impact and the disturbances caused.

Exhibitors from industry ranged in size from the small (Cambridge Ultrasonics) through the medium-sized (Domino Printing Services) to the very large (Ford Motor Company). Cambridge Ultrasonics discussed applications of ultrasonics, such as communicating underwater and in other places where radio doesn't work, and inspecting fuel rods in nuclear reactors, using a modern development of

sonar. Domino Printing showed how physics is used to enable us to print at high speeds on fragile substrates – such as eggs – using ink drops, and discussed some of the problems encountered.

The Ford Motor Company looked into another reality of modern life – recycling. By January 2015, 85% of every vehicle must be recycled and 95% must be recoverable. The recycling and recovery of parts and materials from scrapped cars has been around almost since cars were invented and, in the past, only a small fraction of a scrapped car would end up in landfill. So why should the 2015 requirement be a problem? What has changed is the increasing amount of plastic in cars. Plastics can be difficult to reuse, since they come in so many kinds. Ford has two approaches to the problem – using recycled components and creating "recycling friendly" designs.

Physics at Work was sponsored by: The Cavendish Laboratory, The Institute of Physics East Anglia Branch, The Institute of Physics Education Department, Kodak European Research Laboratories, Carrack Measurement Technology, Goodfellow Metals, and EPSRC through the outreach programme of the Condensed Matter Theory Portfolio Partnership.

A chance to Meet the Employers

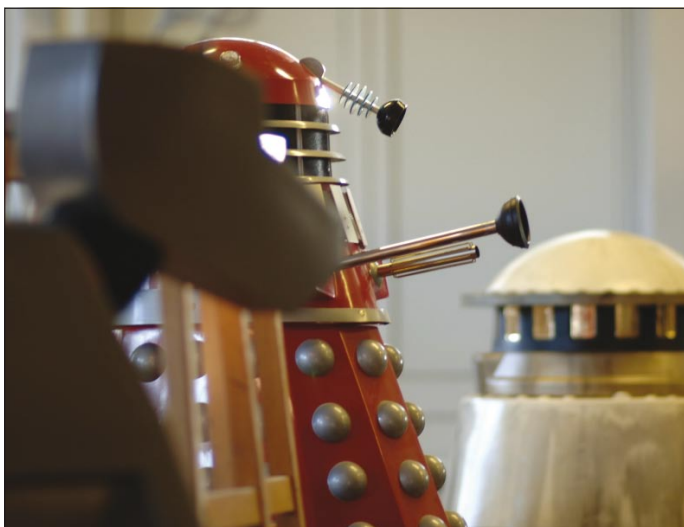
If you are a student in a science-related discipline – not necessarily at the University of Cambridge – or if you are an employer looking for scientifically trained staff, make sure you keep 13 November free for the second Meet the Employers evening. It will be held at the Cavendish Laboratory from 6.00 to 8.00 p.m., and light refreshments will be provided. It is a good opportunity to meet prospective employers (or employees!) in a casual atmosphere. The first Meet the Employers evening attracted over 20 companies and 150 students, and was considered very worthwhile by both.

For more information, please contact Bill Proud (e-mail wgp1000@cam.ac.uk).

Got an idea for a branch event? If so, let us know

E-mail: jeannette.fine@finerandd.com

Main speaker at December Event to be Famelab winner Dr Mark Lewney



Last year, even the Daleks enjoyed the December Event

Facts and fun with fizzix.co.uk

A new website, www.fizzix.co.uk (slogan: "We put the fizz back in physics"), has been set up to tell you all about what's going on in physics in East Anglia. It contains information about physics activities that you can take part in, and information on ways in which you can organise your own events.

The website enables you to send physics questions to real physicists to answer, and to find out about physics organisations near you. Fizzix.co.uk tries to keep an eye on what's what, so check it out!

● Please help us to keep the fizz in the website! If you organise an event, please help it along by letting fizzix.co.uk know what you are up to.

This year, the December Event will take place on 10 December in the Cavendish Laboratory. We intend to sound our trumpet with our main speaker: the winner of Famelab 2005, Dr Mark Lewney.

Dr Lewney is a most interesting speaker (see article on the AGM, p4), and it would be well worth coming to the December Event just for his lecture. We will have an hour of nicely noisy interactive events and expect our audience to keep its ears open for carefully crafted almost-truths from our panellists in Call my Audible Bluff. We expect Dr Lewney's lecture to start at 2.00 p.m., with Call My Bluff at 4.00 p.m.

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www.iop.org

Kelvin Prize for Jenkins

One of the success stories that has come out of the East Anglia branch is Lab in a Lorry, which has now been rolled out UK-wide by the Institute of Physics. The originator of the Lab in a Lorry concept – which is to take real experiments and real scientists to schools – and the driving force behind its development was Charles Jenkins.

Charles was at the time very active in branch affairs, including a one-year stint as branch chair. He was then in a senior research position at Schlumberger, and is now a

senior fellow of the Australian National University, at the Mount Stromlo Observatory.

The Institute has recently recognised this inspiring achievement by awarding Charles the 2007 Kelvin Medal, which is given every three years for "promoting public awareness of the place of physics in the world, of its contributions to the quality of life and its advancement of an understanding of the physical world and the place of humanity within it". Our congratulations and best wishes to Charles.

Pupils get ready for Paperclip Physics 2007

The Paperclip Physics competition is back again this year. Enthusiastic pupils in Years 11 or 12, with between two and four friends who are also interested in physics, have once again roped in their teachers to enter them into Paperclip Physics 2007. The aim of the competition is for each team to demonstrate a concept in physics in five minutes or less.

We will provide the teams with a tabletop, not more than 1.5 x 1.0 m in area. As part

of their demonstration they can use anything found in an ordinary house, except mains water, mains electricity or mains gas. (Funny house, but let's not worry about that.) Note that the competitors will be judged on how likely it is that the props they use would be found in a normal house. So gas cylinders are probably out, but nappies and CDs are in.

The judging panel will include a physicist, a non-scientist and a physics teacher. Teams have to convince the physicist and

the teacher that they know what they are talking about, while ensuring that they explain their concept well enough for the non-scientist to understand it.

Any apparatus that the teams decide to use must be capable of being transported in a car boot, and it must be possible to assemble it and have it in working order within 30 minutes. It must be safe, and they will have to fill out a hazard assessment form to demonstrate that it is. Text and diagrams may be used to assist

the presentation, but must be confined to not more than four sheets of A3 paper or card.

Teams will receive travel expenses, and the winners of each heat will receive books as prizes. The budget has not yet been finalised, but we are hoping that the winning team from the East Anglia region will receive £500, with the runners-up receiving £100.

Although the deadline for applications was Friday 20 October, if you are very quick you may still get in.

Cambridge's Naked Scientists radio programme goes platinum

Another successful outreach effort by the University of Cambridge, Naked Scientists is an interactive science radio show produced at the University of Cambridge and broadcast by the BBC. It has recently achieved the notable feat of two million podcast downloads in the last 12 months, making it one of the world's most downloaded science programmes. It has also been nominated by its listeners in the "best science show" category in the 2006 International Podcast awards.

In each hour-long edition of the programme, the presenters encourage the audience to

experiment in their kitchens alongside the radio show and then call in with their results. So far, listeners have built home-made submarines, recreated the sound of Big Ben chiming inside their heads, and simulated an explosion in a custard factory. The programme also provides highlights from the preceding week's top science news stories and interviews with guest scientists who answer questions posed by the listening public.

Dr Chris Smith, a medical doctor and lecturer from the University of Cambridge, started the programme in 1999. Initially known as ScienceWorld, in

just seven years it has grown from being a weekly local radio show to becoming a national and international presence with inputs to network radio across Australia (ABC Radio National) and the UK (BBC Radio Five Live). On the Internet, the show's companion website www.thenakedscientists.com receives more than 1.5 million hits per week.

The name Naked Scientists arose from Dr Smith's aim of stripping science down to its bare essentials and promoting it to the general public. According to Dr Smith, the basic goal of the Naked Scientists is to "help

people enjoy science as much as we do, and at the same time to have fun".

As a result of the popularity of the website, the Naked Scientists have struggled to find a host server capable of handling the large amount of traffic to the site. Fortunately, a Manchester-based leading UK host, UKFast, has stepped in with a dedicated server to support the website's mega-bandwidth demand.

For further information on the Naked Scientists, please contact the University of Cambridge Office of Communications on 01223 332300.

AGM enjoys talk, elects officers

We tried a new venue for the AGM this year – the conference centre at St Edmundsbury Cathedral in Bury St Edmunds. Although the weather was not propitious – it was cloudy, hot and muggy – the venue itself was comfortable. Our speaker was Dr Mark Lewney, a patent examiner from the UK Patent Office near Newport, South Wales, who was the winner of FameLab in 2005.

Dr Lewney is a fascinating speaker, and told the story of waves, from strings to superstrings, including whale songs along the way. The talk included many demonstrations – he plays a mean electric guitar – many of which were amusing and all of which contributed to the lecture. After the AGM, we concluded with a session in a planetarium, and were shown some interesting work that is being done by the Cerro Paranal telescopes in Chile. This is a

suite of four telescopes with 8.2 m aperture; in the future, the hope is to combine them into one very large telescope.

At the AGM we decided, after a heated discussion, to continue with Paperclip Physics – at least for this year. We also chose the officers for next year.

Regional officer

The Institute has now found a suitable candidate to be its regional officer for the East of England after two rounds of advertising. The appointee, Dr Esther Haines, takes office on 6 November. Her first job will be to prioritise the many opportunities to make a contribution. Those of you who are based in the East Midlands will also have a new regional officer, David Wilkinson, who starts on 2 January 2007. Expect to hear much more in future issues of the newsletter.

New branch committee line-up for coming year

The East Anglia branch officers for next year will be:

- Chair: John Clark (john.clark@finerandd.com)
- Vice-chair: Jeannette Fine (jeannette.fine@finerandd.com)
- Treasurer: Bill Proud (wgp1000@cam.ac.uk)
- Hon. Secretary: Tom Whyntie (bw273@cam.ac.uk)

We also have a good line-up for the rest of the committee,

with a mixture of old and new members. Continuing members are: Michael Carr, Mike Coleman, Harry Druiff, Judith Gretton-Dann, Esther Haines, Paul Millar and Michael Robertson. We are pleased to welcome Claire Kennedy back to the committee after more than a year's absence. We would also like to welcome new members Peter Amos, Dennis Camilleri and Jasmine Tickle, all of whom, I am sure, will provide a sterling service.

The deadline for your contributions to the next issue of this newsletter is: Friday 3 November 2007

Please e-mail your materials to jeannette.fine@finerandd.com

Don't miss the December Event 2006!